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CLAIMS

1. A scribing device for a brittle material substrate, which continuously heats a region along a line to be scribed on a surface of the brittle material substrate at a
5 temperature lower than a softening point of the brittle material substrate and, also, continuously cools a region in the vicinity of the heated region, thereby forming a blind crack along said line to be scribed, said scribing device characterized by comprising:

10 a light guide which is arranged so as to propagate light to and from the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material substrate;

a light projection unit which emits light through said
15 light guide;

a light reception unit which receives, through said light guide, the light emitted from said light projection unit through said light guide and reflected by the blind crack; and

a determination unit which distinguishes a light
20 receiving level obtained by said light reception unit.

2. The scribing device for a brittle material substrate according to claim 1, characterized in that said light guide is an optical fiber.

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3. The scribing device for a brittle material substrate according to claim 1, characterized in that said light guide of said light projection unit is arranged such that the emitted light is reflected on a lower face of said brittle material substrate once and, then, enters the blind crack.

4. The scribing device for a brittle material substrate according to claim 1, characterized in that said determination unit sets thresholds above and below a prescribed reflected light amount level and determines a condition of a blind crack formation based on whether the reflected light amount deviates from the threshold or not.

5. A scribing device for a brittle material substrate, which continuously heats a region along a line to be scribed on a surface of the brittle material substrate at a temperature lower than a softening point of the brittle material substrate and, also, continuously cools a region in the vicinity of the heated region, thereby forming a blind crack along said line to be scribed, said scribing device characterized by comprising:

first and second light guides which are arranged so as to respectively propagate light to and from the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material substrate;

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a light projection unit which emits light through said first light guide;

a light reception unit which receives, through said second light guide, the light emitted from said light projection unit through said first light guide and transmitted through the blind crack; and

a determination unit which distinguishes a light receiving level obtained by said light reception unit.

10 6. The scribing device for a brittle material substrate according to claim 5, characterized in that said light guide is an optical fiber.

15 7. The scribing device for a brittle material substrate according to claim 5, characterized in that said light guide of said light projection unit is arranged such that the emitted light is reflected on a lower face of said brittle material substrate once and, then, enters the blind crack.

20 8. The scribing device for a brittle material substrate according to claim 5, characterized in that said determination unit sets thresholds above and below a prescribed reflected light amount level and determines a condition of a blind crack formation state based on whether the reflected light amount
25 deviates from the threshold or not.

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9. A scribing method for a brittle material substrate, in which a region along a line to be scribed on a surface of a brittle material substrate is continuously heated at a temperature lower than a softening point of the brittle material substrate and, also, a region in the vicinity of the heated region is continuously cooled, so that a blind crack is formed along said line to be scribed, said scribing method characterized by:

emitting light through a light guide toward the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material substrate;

receiving reflected light, obtained from the blind crack, through said light guide; and

performing scribing while checking a condition of the blind crack formation based on a light receiving level.

10. The scribing method for a brittle material substrate according to claim 9, characterized in that an optical fiber is used for said light guide.

11. The scribing method for a brittle material substrate according to claim 9, characterized in that upon emitting light through the light guide toward said blind crack formation region, the emitted light is reflected on a lower

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face of said brittle material substrate once and, then, enters the blind crack.

12. A scribing method for a brittle material substrate,
5 in which a region along a line to be scribed on a surface of a brittle material substrate is continuously heated at a temperature lower than a softening point of the brittle material substrate and, also, a region in the vicinity of the heated region is continuously cooled, so that a blind crack is
10 formed along said line to be scribed, said scribing method characterized by:

emitting light through a first light guide toward the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material
15 substrate;

receiving light, transmitted through the blind crack, through a second light guide; and

performing scribing while checking a condition of the blind crack formation based on a light receiving level.
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13. The scribing method for a brittle material substrate according to claim 12, characterized in that an optical fiber is used for said light guide.

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according to claim 12, characterized in that upon emitting
light through the light guide toward said blind crack
formation region, the emitted light is reflected on a lower
face of said brittle material substrate once and, then, enters
5 the blind crack.

15. An automated breaking line for a brittle material
substrate, characterized by comprising: at least one scribing
device for a brittle material substrate according to claim 1;
10 and at least one device for breaking the brittle material
substrate.

16. An automated breaking line for a brittle material
substrate, characterized by comprising: at least one scribing
15 device for a brittle material substrate according to claim 5;
and at least one device for breaking the brittle material
substrate.

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THE DESCRIPTION BASED ON Article 19(1)

Claim 1 clarifys that emitted light from a light projection unit enters a region of the blind crack formation on the surface of a brittle material substrate after reflecting on a lower face of the brittle material, and that a determination whether a level of light reception signal obtained from a light reception unit is between the predetermined thresholds using a window comparator is made and, then, a confirmation of the normal formation of a blind crack, if the signal is between the thresholds, is made.

Claim 5 clarifys that leading light to a brittle material substrate from a light projection unit through first optical fiber, arranging first optical fiber so as to enter light into the formation of the blind crack on the brittle material substrate, receiving the light transmitting the blind crack through second optical fiber, and confirming the normal formation of a blind crack is made, if the signal is between the thresholds.

Claim 9 represents a present invention of Claim 1 as a method.

Claim 12 represents a present invention of Claim 5 as a method.